XI PHYSICS – FULL PORTION TEST

PART – I

Answer all the questions. 15 x 1 = 15

1. A spring of force constant \( k \) is cut into three equal parts. The force constant of each part will be
   a) \( 3k \)  
   b) \( k/3 \)  
   c) \( 3/k \)  
   d) \( k \).

2. The candela is the luminous intensity in a given direction due to a source, which emits monochromatic radiation of frequency \( \text{___________} \) Hz and of which the radiant intensity in that direction is 1/683 watt per steradian.
   a) \( 520 \times 10^{-23} \)  
   b) \( 540 \times 10^{-15} \)  
   c) \( 540 \times 10^{-12} \)  
   d) \( 520 \times 10^{-9} \).

3. For a perfect rigid body, Young’s modulus is
   a) \( \infty \)  
   b) \(-1\)  
   c) \( 1 \)  
   d) \( 0 \).

4. A long magnetic needle of length \( 2l \), magnetic moment \( M \) and pole strength \( m \) is broken into two at the middle. The magnetic moment and pole strength of each piece will be
   a) \( M/2, m \)  
   b) \( M/2, m/2 \)  
   c) \( M, m \)  
   d) \( M, m/2 \).

5. The amount of force required to reduce the velocity of an object of mass 5 kg from 20 m\( \cdot \)s\(^{-1} \) to 5 m\( \cdot \)s\(^{-1} \) in 2.5 seconds is
   a) \( 30 \) N  
   b) \( 60 \) N  
   c) \( 15 \) N  
   d) \( 1/15 \) N.

6. A block of ice in a room at normal temperature
   a) does not radiate  
   b) radiates more than it absorbs  
   c) radiates as much as it absorbs  
   d) radiates less but absorbs more.

7. The phase difference between the instantaneous velocity and acceleration of a particle executing SHM is
   a) \( \pi \)  
   b) \(-0.707 \pi \)  
   c) \(-0.5 \pi \)  
   d) \( 0 \).

8. The intensity level of two sounds are 100 dB and 50 dB. Their ratio of intensities are
   a) \( 10^1 \)  
   b) \( 10^5 \)  
   c) \( 10^3 \)  
   d) \( 10^{10} \).

9. The mass of a lift is 2000 kg. When the tension in the supporting cable is 28000 N, then its acceleration is
   a) \( 30 \) m\( \cdot \)s\(^{-2} \) downwards  
   b) \( 30 \) m\( \cdot \)s\(^{-2} \) upwards  
   c) \( 4 \) m\( \cdot \)s\(^{-2} \) upwards  
   d) \( 4 \) m\( \cdot \)s\(^{-2} \) downwards.

10. Water rises to a certain height \( h \) in a capillary tube. If now, the length of the tube above the water surface is made less than \( h \), then
    a) water rises up to a point a little below the top and stays there  
    b) water rises up to the top of the tube and stays there without overflowing  
    c) water rises up to the top of the tube and then starts overflowing like a fountain  
    d) water does not rise at all.

11. When two waves which are represented by the equations, \( y_1 = 25 \sin 100\pi t \) and \( y_2 = 25 \sin 108 \pi t \) superimpose with each other, they result in
    a) beats  
    b) Doppler effect  
    c) overtones  
    d) stationary waves.

12. The angular speed of minute arm in a watch is
    a) \( \frac{\pi}{21600} \) rad\( \cdot \)s\(^{-1} \)  
    b) \( \frac{\pi}{12} \) rad\( \cdot \)s\(^{-1} \)  
    c) \( \frac{\pi}{3600} \) rad\( \cdot \)s\(^{-1} \)  
    d) \( \frac{\pi}{1800} \) rad\( \cdot \)s\(^{-1} \).

13. An ideal gas is compressed to half its initial volume by means of several processes. Which of the process results in the maximum work being done on the gas?
    a) Isochoric (same volume)  
    b) Isothermal (same temperature)  
    c) Adiabatic (same heat)  
    d) Isobaric (same pressure)

14. Which of the following objects do not belong to solar family?
    a) Constellations  
    b) Comets  
    c) Asteroids  
    d) Planets.

15. The refractive index of water is 1.33. What will be the speed of light in water?
    a) \( 1.33 \times 10^8 \) m\( \cdot \)s\(^{-1} \)  
    b) \( 1.25 \times 10^8 \) m\( \cdot \)s\(^{-1} \)  
    c) \( 1.75 \times 10^8 \) m\( \cdot \)s\(^{-1} \)  
    d) \( 2.25 \times 10^8 \) m\( \cdot \)s\(^{-1} \).
PART–II
Answer any six questions in which question no. 23 is compulsory.  6 x 2 = 12
16. A copper vessel feels much cooler than a wooden table on winter days. Why?
17. A mass \( m \) attached to a spring oscillates every 4 seconds. If the mass is increased by 4 kg, the period increases by 1 s. Find its initial mass \( m \).
18. Differentiate between speed and velocity.
19. Why the blood pressure in humans is greater at the feet than at the brain?
20. The acceleration due to gravity at the moon’s surface is 1.67 m s\(^{-2}\). If the radius of the moon is \( 1.74 \times 10^6 \) m, calculate the mass of the moon.
21. The surfaces of the sun glasses are curved, yet their power may be zero. Why?
22. State the parallel axes theorem.
23. If the mass of a proton is \( 1.67 \times 10^{-27} \) kg, how many electrons would weigh 1 kg?
24. As you go up in the atmosphere, will the velocity of sound be the same? Why?

PART–III
Answer any six questions in which question no. 28 is compulsory.  6 x 3 = 18
25. The bob of a simple pendulum is a hollow sphere filled with water. How does the period of oscillation change if the water begins to drain out of the sphere?
26. What are the limitations of dimensional analysis?
27. A body is projected upwards with a velocity of 30 m s\(^{-1}\) at an angle of 30° with the horizontal. Determine (a) the time of flight (b) the range of the body and (c) the maximum height attained by the body.
28. Obtain the expression for the magnetic induction at a point on the axial line of a bar magnet.
29. Explain the motion of centre of mass of a system with an example.
30. Draw the stress-strain curve and mark on it (i) elastic limit, (ii) permanent strain, (iii) yield point and (iv) breaking stress.
31. Calculate specific heat capacity for triatomic gases.
32. State Kepler’s laws of planetary motion.
33. Two tuning forks A and B when sounded together produce 4 beats. If A is in unison with the 0.96 m length of a sonometer wire under a tension, B is in unison with 0.97 m length of the same wire under same tension. Calculate the frequencies of the forks.

PART–IV
Answer all the questions  5 x 5 = 25
34. (i) Given the value of \( G \) in cgs system is \( 6.67 \times 10^{-8} \) dyne cm\(^2\) g\(^{-2}\). Calculate its value in SI units.
   (ii) Write the limitations of dimensions.
   OR
   (i) Explain the physical significance of moment of inertia.
   (ii) Show that the moment of inertia of a rigid body is twice the kinetic energy of rotation.
35. State and explain the parallelogram law of vectors. Discuss the special cases.
   OR
   (i) A particle executes a simple harmonic motion of time period \( T \). Find the time taken by the particle to have a displacement from mean position equal to its amplitude.
   (ii) Show that the oscillations of a simple pendulum are simple harmonic. Hence deduce the expression for the time period.
36. Explain the principle, construction and working of hydraulic brakes.
   OR
   (i) Explain the phenomenon of hysteresis with a graph.
   (ii) Which of the two materials: soft iron or steel, is preferred as a core of transformer? Why?
37. Explain how overtones are produced in an open organ pipe. Derive the expression for the various frequencies present in the open pipe. Why open organ pipes are preferred for making flute?

OR

(i) State Newton’s law of cooling and draw the cooling curve.

(ii) A metal cube takes 5 minutes to cool from 60° C to 52° C. How much time will it take to cool to 44° C, if the temperature of the surroundings is 32° C?

38. What is escape speed? Derive the expression for the same. Give its value for any two planets.

OR

(i) Explain the image formation in plane mirrors.

(ii) A man 2 m tall standing in front of a plane mirror whose eye is 1.90 m above the ground. What is the minimum size of the mirror required to see complete image?